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tation and all sent delegates except the University of Iowa. The institutions represented were the University of Missouri, the University of Nebraska, Washington University, Drake University, the Iowa State College, and the University of Kansas. Of these the universities of Nebraska, Missouri and Kansas were represented by members of the board of regents or curators and the presidents of the institutions. Drake University was represented by its president, Iowa State College of Agriculture and Washington University by professors sent by the governing boards of the institutions to represent them. The meeting resulted in a general conference upon athletics as affecting institutions in the Missouri Valley and rules were passed by the Conference and afterwards reenacted by the individual boards of regents, largely affecting the status of intercollegiate football. Among these was the rule abolishing the game on Thanksgiving Day, abolishing the short-term professional coach, and requiring that all college games be played on college grounds.

The second conference was held at Des Moines, January 6, 1911, at which various questions left over from the Kansas City meeting were discussed and acted upon. At that conference the University of Iowa was also represented by its president and board of regents. Washington University was not represented. The discussion at this conference widened out to include other things than athletics. A general discussion of the fraternity question was ordered for the next meeting and committees on uniform financial accounting and uniform pedagogical accounting were authorized. It was plain from the discussions at the second conference, and indeed by formal action, that it was intended to make the conference a permanent one to take into consideration any question touching the common life of universities that might need consideration and uniform action.

The third meeting of the Conference was held in Lincoln, Nebraska, January 19, 1914. The University of Iowa had in the meantime withdrawn from the Missouri Valley Conference and the State Agricultural College of

Kansas had been added. All of the institutions in the Conference were represented. Most of the attention of this conference was given up to matters other than athletic and it was more evident than before that the Conference was developing into a general conference on the welfare of the universities having so much in common. The fraternity question received much attention, as did the question of competency in teaching. It is probable that in succeeding meetings such questions as the following may be taken up and discussed, if not formally acted upon: the ethics to be observed in calling teachers from one institution to another; substantially uniform salaries for the same grade of instructors; cooperation in giving advanced and little called for courses; interchange of students and instructors; cost of education. It seems possible, therefore, that this Conference is a beginning of a new type of cooperation, having especial significance and authority because of the fact that the Conference is made up of presidents and governing boards where the primary power lies.

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#### SCIENTIFIC BOOKS

*From the Letter Files of S. W. Johnson.*

Edited by his daughter, ELIZABETH H. OSBORNE. Yale University Press. 1913. Pp. 292.

A notable feature of the applications of science to the arts and industries which characterized the second half of the nineteenth century was the phenomenal evolution of agencies for scientific investigation in the interest of agriculture and the rise of a system of public research institutions extending over every country of the civilized world. The life story of the subject of this biography is essentially the story of the birth of this system in the United States and its growth from a few modest analytical laboratories to an imposing group of national and state institutions actively engaged in agricultural research, in the teaching of agricultural science,

and in the dissemination of the results of investigation.

The career of Samuel W. Johnson presents few dramatic features. He lived the quiet, simple life of the student, occupying a professorial chair in a single university for forty years, yet few, if any, have exerted a more profound influence for the promotion of scientific agriculture. A man of genius as well as of thorough training, he early conceived the idea of making the conquests of science serviceable to the basal industry of the country. Even in his student days, in 1851, he published an article—"County Agricultural Institutes"—setting forth his earliest conceptions of the ideas which later assumed a more definite form. Five years later, in an address before the New York State Agricultural Society on the subject "The Relations which exist between Science and Agriculture" he said:

"I have full faith not only that science *may* accomplish much for agriculture in the way I have indicated, but that she *will* be speedily put about the work. The tendencies of our time prophesy this. The notion that there is anything essentially antagonistic between science and practise is daily meeting its refutation, both in the laboratory and in the field. I may confidently ask, where better than in our own country shall this idea find realization? Our country now has the strength of the oldest nations with all the freshness of youth. She is girding herself up to contest among the nations for the prize of science. What worthier triumph for our republic than to win for her millions the boon of a rational agriculture?"

But Professor Johnson had not only the genius to conceive this ideal and the faith to follow it throughout a long and fruitful career, but the tact and persistence necessary to bring about its institutional embodiment.

His first opportunity presented itself in connection with the introduction of commercial fertilizers into the United States. In March, 1853, he published, under the title "Superphosphate of Lime," an account of the results of analyses which he had made of

two samples of artificial fertilizers offered for sale. This work was probably the first of its kind in this country and was the prototype of a vast amount of similar work during the next twenty-five years, done at first as a private undertaking and later as chemist of the Connecticut State Agricultural Society and of the Connecticut State Board of Agriculture. "It was characteristic of the man first to form and tenaciously hold the broad idea, based upon a universal and permanent need; and then, realizing an opportunity for practical work, to set about using his skill and knowledge in routine analysis performed with all possible accuracy in order that these simple analyses should be so absolutely right that they might be an unassailable foundation for the wider work to come after."

In 1853 he was appointed first assistant and in 1856, professor of analytical chemistry in the Yale Scientific School—later the Sheffield Scientific School—and with various titles remained an active member of its faculty until 1896. During all these years, with the capacity and equipment to take high rank among scientific investigators, he devoted his powers chiefly to the instruction of his students, to the preparation of those classic text-books, "How Crops Grow" and "How Crops Feed," and to the service of the farmers of his state in promoting the popular understanding of the aid which science could render to agriculture. His platform was the farmers' meeting, his means of publication chiefly the official report and the agricultural newspaper; while the humble and prosaic work of fertilizer analysis served to furnish the practical demonstration.

Not for almost a quarter of a century did he see the concrete result of his labors in the establishment in Connecticut of the first agricultural experiment station in the United States, at first as a semi-private institution and two years later as an independent state institution under his directorship. This was followed by the founding of similar stations in other states in rapid succession, culminating ten years later in the passage of the "Hatch

Act," providing national support for at least one such station in every state. At the time of his death, in 1909, there were fifty-six of these stations in the United States with an average annual income almost eleven times that of the Connecticut station at its foundation, to say nothing of the enormously increased research activities of the United States Department of Agriculture. Truly the little seed planted in 1853 had become a tree.

In the organization and development of these new institutions the standards established by Professor Johnson and the experience gained at the Connecticut station were material factors in bringing about the success which was so soon attained. At the outset, the American stations were of necessity largely occupied with the analysis and valuation of fertilizers. From the very start, however, original research formed a part of the program of the Connecticut station, while the increase of the state appropriation in 1882 and the assignment to the station in 1887 of part of the Hatch Fund, enabled investigation to be extended to wider fields. Throughout, the work of this station, both under Professor Johnson's administration and that of his successor, has been characterized by the same sane method, the same absence of sensationalism and the same confidence in the power of good works which characterized the fertilizer analyses of the early fifties.

In 1896, Professor Johnson became professor emeritus, and in 1900 resigned the office of director of the experiment station, occupying for a year longer the position of advising chemist which was created for him. He passed peacefully away July 21, 1909, having retained to the last his keen interest in the progress of science and in the problems presented in the development of modern chemistry.

Such was, in barest outline, the active life of an unusually gifted man who had a high conception of the obligations of the scientist to the public. No brief review can do justice to the delightful personality of the man as those knew it who were closely associated with

him, and which pervades the book like an aroma, revealing itself especially in the judiciously chosen extracts from his correspondence which constitute the major portion of the volume. His biographer has done her work, not only with filial piety but with notable discrimination and restraint and with marked literary ability. In these days of intense emphasis upon the practical, no more inspiring or elevating volume can be recommended to the student of agriculture who is looking forward to a career as teacher or investigator than this record of a life which attained success in the best sense through the unselfish consecration to the public service of the rigid training and high ideals of the genuine man of science.

H. P. ARMSBY

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*Researches on Irritability of Plants.* By J. C. BOSE. London and New York, Longmans, Green and Co. 1913. Cloth, 15 x 23 cm. Pages xxiv + 376; 190 illustrations, largely graphs. Price \$2.50.

Physiologists who are familiar with the earlier electrophysiological researches of Bose will be interested in his recent volume on certain kinds of plant responses, which recounts the results of an application of his very ingenious methods to new kinds of problems. Research workers will find this book replete with novel ideas and novel ways of attaining quantitatively comparable measures of plant irritability. The author is not primarily dealing with the fundamental problems of protoplasmic phenomena; his work may be said to concern itself, rather, with the physics of the plant as a whole, or with that of its organs, than with the component cell happenings to which recent physiological inquiry seeks to reduce these aggregates. It is somewhat remarkable that animal physiology, on the one hand, has attained a high state of development along the lines here dealt with (with its studies of the superficial phenomena of muscle contraction, blood pressure, the electrophysiology of muscle and nerve, etc.), and that the findings of this sort of study form a very